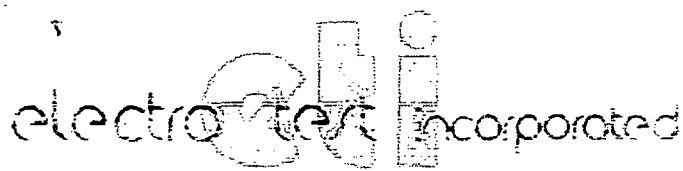


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Independent Testing & Engineering Services for Electrical Power Systems

Pacific Northwest
REGIONAL OFFICE

3290 146TH PLACE, S.E.
BELLEVUE, WA 98007

(206) 562-0188
FAX (206) 562-0187

March 21, 1989

copy MARK WILKES FOR HIS APPROVAL

Ashgrove Cement
3801 East Marginal Way
Seattle, Washington 98134

Attention: Mr. Ken Rone

Subject: Ground Fault Relay Test
ETI Reference No. 306916

Dear Ken:

Attached are two copies of the subject test report. It was our pleasure working with you on this project. If you have any questions, or if we can be of further assistance, please feel free to call me.

Sincerely,

ELECTRO-TEST INC.

Wayne A. Ulrich
Wayne A. Ulrich
Operations Supervisor

WAU:js

Attachment





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BELLEVUE, WA 98007
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GROUND FAULT SYSTEM TEST REPORT

ETI REFERENCE NO. 306916

MARCH 21, 1989

ASHGROVE CEMENT
3801 E. MARGINAL WAY
SEATTLE, WASHINGTON 98134

LOCATION: ASHGROVE
CEMENT, SEATTLE

ATTENTION: MR. KEN RONE

1.0 PURPOSE

Performance tests of ground fault protective equipment are conducted to verify proper installation and operation. The current National Electrical Code, Section 230-95 (c) requires an on site test on new installations of all ground fault systems upon installation.

2.0 SUMMARY

- 2.1 At the request of Mr. Ken Bone of Ashgrove Cement, ground fault system testing was performed by Electro-Test Engineer, Mr. Mark Mader on March 8, 1989.
- 2.2 The ground fault components were tested and found to be correctly installed and operating properly. The neutral wiring is not complete at this time. The contractor is responsible to verify the neutral is not grounded downstream of the neutral disconnect link, once all neutral wiring is completed.
- 2.3 Relay settings were provided by Dave of Midland Electric. The left settings are 1200 amps, .5 second delay.

3.0 EQUIPMENT TESTED

- 3.1 Ground Fault System for the Main Circuit Breaker. Westinghouse type PCCG 2000 Amp with integral ground fault function.
- 3.2 Setting ranges: pick-up 200-1200; delay 0-.5 seconds

4.0 TEST PROCEDURES

4.1 Visual Inspection

- 4.1.1 Inspected components for physical damage, and installation in compliance with manufacturer's instructions.
- 4.1.2 Determined ground sensor was located properly around appropriate conductor(s).
 - o Zero sequence and residual sensing requires all phases and the neutral to be encircled by the sensor(s).
- 4.1.3 Inspected main bonding jumper to assure:
 - o Proper size.
 - o Termination on line side of neutral disconnect link.
 - o Termination on line side of sensor on zero sequence systems.
- 4.1.4 Inspected grounding electrode conductor to assure:
 - o Proper size.
 - o Correct switchboard termination.
- 4.1.5 Visually inspected switchboard neutral bus downstream of neutral disconnect link to verify absence of ground connections.

4.2 Electrical Tests

- 4.2.1 Ground fault system performance including correct response of the circuit interrupting device was confirmed by primary ground sensor current injection.
 - o Relay pickup current was measured.
 - o Relay time delay was measured at two values above pickup.

4.2.4 Verified proper sensor polarity on phase and neutral sensors for residual systems.

4.3 Test Results Evaluation

4.3.1 The maximum pickup setting of the ground fault protection shall be 1200 amperes, and the maximum time delay shall be one second for ground fault currents equal to or greater than 3000 amperes (NEC 230-95).

4.3.2 The relay pickup current should be within ten percent (10%) of the manufacturer's calibration marks or fixed setting.

4.3.3 Relay timing should be in accordance with the manufacturer's published time-current characteristic curves.

5.0 RESULTS

5.1 The ground fault relay and sensor(s) were found correctly installed and operating properly.

5.2 The system neutral wiring was not complete at the time of testing. The contractor must verify proper routing of neutral conductors through the neutral sensor if applicable. The contractor must verify that the neutral is not grounded downstream of the neutral disconnect link once the installation is complete. Improper installation may desensitize the operation of the ground fault system or result in nuisance tripping.

Submitted by,



Mark Mader



electro-test inc. SAN FRANCISCO - LOS ANGELES - SEATTLE - DENVER

GROUND FAULT SYSTEM TEST REPORT



CLIENT ASHGROVE CEMENT		JOB NO. 306914				
LOCATION 3001 E. MARSHALL WAY		DATE 3-8-89				
SWGR. DESIGNATION 200CA SUBD (BAG PLANT)		ENGR. M.M.	WITNESS			
FIELD DATA						
SWITCHBOARD MANUFACTURER (W)		SHOP ORDER NO. P039195	UL NO. C-117336			
MAIN OVERCURRENT DEVICE <input checked="" type="checkbox"/> CIRCUIT BREAKER <input type="checkbox"/> FUSED SWITCH		MFG. (W)				
TYPE RCC	MODEL/CAT. NO. P006500 F	CURRENT RATING 200	SYSTEM VOLTAGE 227400			
GROUND FAULT SYSTEM <input type="checkbox"/> NEUTRAL-GROUND STRAP <input checked="" type="checkbox"/> ZERO-SEQUENCE		MFG. INTEGRAL				
MODEL -	CAT. NO. -	PICK-UP RANGE 200-200	TIME RANGE 0-5 SEC.			
AS FOUND SETTING PICKUP CURRENT 200 TIME .5		SETTINGS SUPPLIED BY RELAY ENGINEERING				
INSPECTION						
SERVICE ENTRANCE CONDUCTORS 14/3 AL 3 PER PHASE		MAIN BONDING JUMPER 14/2 AL				
GROUND ELECTRODE CONDUCTOR 350 MCM		<input type="checkbox"/> MCM				
NEUTRAL-GROUND LOCATION <input checked="" type="checkbox"/> CORRECT <input type="checkbox"/> INCORRECT <input type="checkbox"/> CORRECTED BY CONTRACTOR		CONTROL POWER TRANSFORMER N/A VA				
MONITOR/TEST PANEL OPERATION <input type="checkbox"/> CORRECT <input type="checkbox"/> INCORRECT <input type="checkbox"/> CORRECTED		OTHER N/A				
ELECTRICAL TESTS						
BREAKER/SWITCH REACTION TIME (RT) <input type="checkbox"/> SECONDS <input type="checkbox"/> CYCLES		REDUCED VOLTAGE TEST (65% RATED VOLTAGE) N/A <input type="checkbox"/> CORRECT <input type="checkbox"/> INCORRECT				
PICK-UP CURRENT 210 AMPS		PICK-UP CURRENT MINUS 25% (— AMPS) <input checked="" type="checkbox"/> NO TRIP (CORRECT) <input type="checkbox"/> TRIP (INCORRECT)				
SYSTEM NEUTRAL INSULATION RESISTANCE TO GROUND NEUTRALS NOT LAID		OTHER -				
TIME-CURRENT CALIBRATION TESTS	PRIMARY CURRENT AMPERE-TURNS	PERCENT PICK-UP	TOTAL TIME	REACTION TIME	RELAY TIME	MFG. TOLERANCE
	600X1	200	.49			
	600X1	300	.48			
REMARKS P.U. at 200 TRIP ACCEPTED						

FORM 0201

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